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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventorship ..... Omoigui
Applicant ..... Microsoft Corporation
Attorney's Docket No. MS1-364US
Title: Live Presentation Searching

TRANSMITTAL LETTER AND CERTIFICATE OF MAILING

To: Commissioner of Patents and Trademarks
Washington, D.C. 20231

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The following enumerated items accompany this transmittal letter and are being submitted for the matter identified in the above caption.

1. Transmittal Letter with Certificate of Mailing included.
2. PTO Return Postcard Receipt
3. Fee Transmittal
4. New patent application (title page plus 34 pages, including claims 1-57 & Abstract)
5. Executed Declaration
6. 6 sheets of formal drawings (Figs. 1-6)
7. Assignment w/Recordation Cover Sheet

Large Entity Status [x] Small Entity Status [ ]

The Commissioner is hereby authorized to charge payment of fees or credit overpayments to Deposit Account No. 50-0463 in connection with any patent application filing fees under 37 CFR 1.16, and any processing fees under 37 CFR 1.17.

Date: 12/16/99

By: _____
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CERTIFICATE OF MAILING

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Date: 12/16/1999

By: Lori A. Vierra
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION FOR LETTERS PATENT

Live Presentation Searching

Inventor(s):
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ATTORNEY'S DOCKET NO. MS1-364US

TECHNICAL FIELD

This invention relates to networked client/server systems and to methods of delivering and rendering live content in such systems. More particularly, the invention relates to searching for live presentations.

BACKGROUND OF THE INVENTION

The advent of computers and their continued technological advancement has revolutionized the manner in which people work and live. Information that used to be available only in written or verbal form is becoming increasingly available in electronic form. Furthermore, presentations which used to be available only on particular recording media (e.g., film or tape) or via television broadcasts are now available in digital form (e.g., over the Internet).

One problem encountered by users when faced with this continually increasing mass of digital information is the ability to locate particular information that the user is interested in. For example, trying to locate a particular presentation can be difficult and cumbersome for users. Various search mechanisms exist for pre-recorded "on-demand" presentations (e.g., various world wide web search engines). On-demand presentations are fairly easily searchable because the underlying data of the presentation is already known. However, in the case of live presentations, such underlying data is not known because, as the presentation is live, the underlying data is not available yet.

Some systems do exist that allow a user to identify scheduled live presentations. For example, a television programming guide may be available over the Internet that allows a user to search for television programs that are scheduled to be broadcast (e.g., via cable, satellite system, or typical television

broadcast frequencies, such as UHF or VHF) and their associated broadcast times. However, such programming guides typically do not provide the flexibility to allow non-scheduled programs to be identified to the user. Furthermore, such programming guides are typically limited to television broadcasts and do not allow users to identify presentations from any of the wide variety of alternate sources (such as via the Internet).

The invention described below addresses these disadvantages, providing a way to search for live presentations.

SUMMARY OF THE INVENTION

In a networked client/server system, live presentations can be streamed from an encoder or other server to a client computer. Additionally, information describing the presentation is registered with a search server. This information is made available for user searches only for as long as the information properly describes the live presentation. When the information no longer describes a current live presentation, the information is no longer available for searching.

According to one aspect of the invention, the information describes the entire presentation. The information is available in the search server for user searches for the duration of the presentation. Once the presentation is over, the information is deleted from the search server, preventing any subsequent user search requests from being satisfied using the information describing that presentation.

According to another aspect of the invention, the information describes a particular characteristic(s) of the presentation (e.g., the current topic). The information for a characteristic is available in the search server for user searches

for as long as that characteristic describes the portion of the presentation currently being presented. Once that characteristic no longer describes the portion currently being presented, the information describing that characteristic is deleted from the search server, preventing any subsequent user search requests from being satisfied using the information describing that characteristic.

According to another aspect of the invention, a user can register a notification request with the search server. The notification request identifies a set of search criteria as well as a manner in which the user should be notified in the event a live presentation matches the search criteria. The search server continues to compare new information regarding available live presentations to the search criteria. If a match is found, the search server notifies the user in whatever manner the user requested.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 shows a client/server network system and environment in accordance with one embodiment of the invention.

Fig. 2 shows a general example of a computer that can be used in accordance with the invention.

Fig. 3 illustrates an exemplary search server in more detail.

Fig. 4 illustrates entries of an exemplary content database in more detail.

Fig. 5 shows exemplary steps in a process for allowing searching of live presentations.

Fig. 6 shows exemplary steps in a process for allowing searching of current characteristics information in live presentations.

DETAILED DESCRIPTION

General Network Structure

Fig. 1 shows a client/server network system and environment in accordance with one embodiment of the invention. Generally, the system includes multiple (*n*) network client computers 102, multiple (*m*) encoders 104, and a search server 106. The computers 102, encoders 104, and server 106 communicate with each other over a data communications network. The communications network in Fig. 1 is a public network 108, such as the Internet. The data communications network might also include local-area networks and/or private wide-area networks, and can include both wired and wireless sections. Client computers 102, encoders 104, and server 106 can communicate with one another via any of a wide variety of known protocols, such as the Hypertext Transfer Protocol (HTTP).

Encoders 104 receive live content or presentations in the form of different media streams 110. Encoders 104 can be dedicated media servers, or alternatively other more general-purpose computer systems. These media streams 110 can be individual media streams (e.g., audio, video, graphical, etc.), or alternatively can be composite media streams including two or more of such individual streams. The media streams 110 are provided to encoders on a "live" basis from other data source components through dedicated communications channels or through the Internet itself. Encoders 104 coordinate the streaming of the live content to other components on the network 108 that request the content, such as client computers 102. It is to be appreciated that although the media streams are referred to as being "live", there may be a delay (e.g., between one second and thirty seconds)

between the time of the actual event and the time the media streams reach the encoder(s).

There are various standards for streaming media content and composite media streams. "Advanced Streaming Format" (ASF) is an example of such a standard, including both accepted versions of the standard and proposed standards for future adoption. ASF specifies the way in which multimedia content is stored, streamed, and presented by the tools, servers, and clients of various multimedia vendors. ASF provides benefits such as local and network playback, extensible media types, component download, scalable media types, prioritization of streams, multiple language support, environment independence, rich inter-stream relationships, and expandability. Further details about ASF are available from Microsoft Corporation of Redmond, Washington.

Encoders 104 can transmit any type of presentation over the network 108. Examples of such presentations include audio/video presentations (e.g., television broadcasts or presentations from a "NetShow™" server (available from Microsoft Corp. of Redmond, Washington)), video-only presentations, audio-only presentations, graphical or animated presentations, etc.

Search server 106 maintains a content database 112, a notification database 114, and a scheduled presentations database 116. In content database 112, server 106 maintains descriptive information regarding the current live content available from encoders 104. A user of a client computer 102 can access search server 106 to search for particular live content. In notification database 114, server 106 maintains information regarding users of client computers 102 that have registered to be notified when particular live content is available. In scheduled presentations

database 116, server 106 maintains information regarding future live presentations that have been registered with server 106.

Exemplary Computer Environment

In the discussion below, the invention will be described in the general context of computer-executable instructions, such as program modules, being executed by one or more conventional personal computers. Generally, program modules include routines, programs, objects, components, data structures, etc. that perform particular tasks or implement particular abstract data types. Moreover, those skilled in the art will appreciate that the invention may be practiced with other computer system configurations, including hand-held devices, multiprocessor systems, microprocessor-based or programmable consumer electronics, network PCs, minicomputers, mainframe computers, and the like. In a distributed computer environment, program modules may be located in both local and remote memory storage devices.

Alternatively, the invention could be implemented in hardware or a combination of hardware, software, and/or firmware. For example, the invention could be implemented in one or more application specific integrated circuits (ASICs).

Fig. 2 shows a general example of a computer 142 that can be used in accordance with the invention. Computer 142 is shown as an example of a computer that can perform the functions of any of client computers 102, server encoders 104, or server 106 of Fig. 1.

Computer 142 includes one or more processors or processing units 144, a system memory 146, and a system bus 148 that couples various system components including the system memory 146 to processors 144.

The bus 148 represents one or more of any of several types of bus structures, including a memory bus or memory controller, a peripheral bus, an accelerated graphics port, and a processor or local bus using any of a variety of bus architectures. The system memory includes read only memory (ROM) 150 and random access memory (RAM) 152. A basic input/output system (BIOS) 154, containing the basic routines that help to transfer information between elements within computer 142, such as during start-up, is stored in ROM 150. Computer 142 further includes a hard disk drive 156 for reading from and writing to a hard disk, not shown, a magnetic disk drive 158 for reading from and writing to a removable magnetic disk 160, and an optical disk drive 162 for reading from or writing to a removable optical disk 164 such as a CD ROM or other optical media. The hard disk drive 156, magnetic disk drive 158, and optical disk drive 162 are connected to the system bus 148 by an SCSI interface 166 or some other appropriate interface. The drives and their associated computer-readable media provide nonvolatile storage of computer readable instructions, data structures, program modules and other data for computer 142. Although the exemplary environment described herein employs a hard disk, a removable magnetic disk 160 and a removable optical disk 164, it should be appreciated by those skilled in the art that other types of computer readable media which can store data that is accessible by a computer, such as magnetic cassettes, flash memory cards, digital video disks, random access memories (RAMs) read only memories (ROM), and the like, may also be used in the exemplary operating environment.

A number of program modules may be stored on the hard disk, magnetic disk 160, optical disk 164, ROM 150, or RAM 152, including an operating system 170, one or more application programs 172, other program modules 174, and program data 176. A user may enter commands and information into computer 142 through input devices such as keyboard 178 and pointing device 180. Other input devices (not shown) may include a microphone, joystick, game pad, satellite dish, scanner, or the like. These and other input devices are connected to the processing unit 144 through an interface 182 that is coupled to the system bus. A monitor 184 or other type of display device is also connected to the system bus 148 via an interface, such as a video adapter 186. In addition to the monitor, personal computers typically include other peripheral output devices (not shown) such as speakers and printers.

Computer 142 operates in a networked environment using logical connections to one or more remote computers, such as a remote computer 188. The remote computer 188 may be another personal computer, a server, a router, a network PC, a peer device or other common network node, and typically includes many or all of the elements described above relative to computer 142, although only a memory storage device 190 has been illustrated in Fig. 2. The logical connections depicted in Fig. 2 include a local area network (LAN) 192 and a wide area network (WAN) 194. Such networking environments are commonplace in offices, enterprise-wide computer networks, intranets, and the Internet. In the described embodiment of the invention, remote computer 188 executes an Internet Web browser program such as the "Internet Explorer" Web browser manufactured and distributed by Microsoft Corporation of Redmond, Washington.

When used in a LAN networking environment, computer 142 is connected to the local network 192 through a network interface or adapter 196. When used in a WAN networking environment, computer 142 typically includes a modem 198 or other means for establishing communications over the wide area network 194, such as the Internet. The modem 198, which may be internal or external, is connected to the system bus 148 via a serial port interface 168. In a networked environment, program modules depicted relative to the personal computer 142, or portions thereof, may be stored in the remote memory storage device. It will be appreciated that the network connections shown are exemplary and other means of establishing a communications link between the computers may be used.

Generally, the data processors of computer 142 are programmed by means of instructions stored at different times in the various computer-readable storage media of the computer. Programs and operating systems are typically distributed, for example, on floppy disks or CD-ROMs. From there, they are installed or loaded into the secondary memory of a computer. At execution, they are loaded at least partially into the computer's primary electronic memory. The invention described herein includes these and other various types of computer-readable storage media when such media contain instructions or programs for implementing the steps described below in conjunction with a microprocessor or other data processor. The invention also includes the computer itself when programmed according to the methods and techniques described below. Furthermore, certain sub-components of the computer may be programmed to perform the functions and steps described below. The invention includes such sub-components when they are programmed as described. In addition, the invention described herein

includes data structures, described below, as embodied on various types of memory media.

For purposes of illustration, programs and other executable program components such as the operating system are illustrated herein as discrete blocks, although it is recognized that such programs and components reside at various times in different storage components of the computer, and are executed by the data processor(s) of the computer.

Search Server

Fig. 3 illustrates an exemplary search server in more detail. Search server 106 includes a query interface 210, a registration interface 212, a search engine 214, and a database controller 216. Client computers 102 (Fig. 1) communicate with search server 106 via query interface 210. Query interface 210 allows users of client computers 102 to enter search criteria for live content. Upon receipt of a search request via query interface 210, search engine 214 accesses content database 112 to search for live content that matches the search criteria.

Encoders 104 (Fig. 1) communicate with search server 106 via registration interface 212. Registration interface 212 allows encoders 104 to provide descriptive information regarding the live content that they can stream to client computers. This descriptive information can then be added to content database 112 and used for searches by search engine 214. Descriptive information can be maintained by server 106 for any live content that can be provided by encoders 104.

Database controller 216 manages the databases 112, 114, and 116. This management includes both adding entries to and removing entries from databases 112, 114, and 116.

Live content or presentations available from encoders 104 can be either pre-scheduled or non-scheduled. Pre-scheduled presentations refer to presentations that have been registered with search server 106 as occurring in the future (e.g., not already in progress and not starting within the next five minutes). Descriptive information regarding pre-scheduled presentations (e.g., presentation title, key words describing the content of the presentation, and encoder(s) from which the presentation will be available) can be provided to server 106 from one of the encoders 104 or some other source, either via the network 108 (Fig. 1) or alternatively some other delivery mechanism (e.g., a magnetic or optical disk).

Non-scheduled presentations refer to presentations that have not been registered with search server 106 as occurring in the future. A non-scheduled presentation is registered with server 106 as the presentation is about to begin (e.g., within the next five minutes) or shortly after it has begun. The presentation can be registered by an encoder 104 (e.g., the encoder 104 that will be streaming the live content), or alternatively some other source. As part of the registration process, server 106 is provided with descriptive information regarding the presentation.

Fig. 4 illustrates entries of an exemplary content database in more detail. Fig. 4 is described with additional reference to components in Fig. 3. Each entry in content database 112 includes data for one or more of the following fields: title 230, source 232, duration 234, current characteristic(s) 236, and descriptive information 238. Content database 112 can be stored in volatile memory (e.g.,

RAM), non-volatile memory (e.g., a magnetic disk drive), or a combination thereof.

Title field 230 includes a descriptive title of the presentation. Source field 232 identifies the encoder(s) 104 from which the presentation can be obtained. Duration field 234 identifies, for some entries, the duration of the presentation; in other entries, the duration data is not included. Characteristics field 236 optionally identifies the current characteristics for the presentation (i.e., one or more characteristics describing the portion of the presentation currently being presented or about to be presented). Any of a wide variety of characteristics can be included for the presentation, such as the current topic (as illustrated in Fig. 4), the name of the current speaker, the gender of the current speaker, the color of the current speaker's clothing, etc. Descriptive information field 238 provides various descriptive information that describes the content of the presentation.

Content database 112 maintains information identifying each of the currently available live presentations that is registered with server 106. Information regarding pre-scheduled presentations that are not currently available (or shortly will be available) from an encoder 104 is maintained in scheduled database 116. Alternatively, such information could be included in content database 112 and simply marked as "invalid" until the presentation is available from an encoder 104.

In the illustrated example, each current live presentation has an associated entry in database 112. When a pre-scheduled presentation is about to begin (e.g., it is scheduled to begin shortly, such as within two minutes), database controller 216 (Fig. 3) loads descriptive information corresponding to the presentation into an entry of database 112. In the case of pre-scheduled presentations, this

descriptive information is loaded from pre-scheduled presentations database 116. In the case of non-scheduled presentations, this descriptive information is received directly from registration interface 212.

When a presentation is over, the entry in database 112 corresponding to the presentation is deleted. Server 106 is provided with an indication of the duration of a live presentation from the encoder or other device that registered the presentation with server 106. In one implementation, this indication of the duration is a time period or "run time" for the presentation. For example, an encoder may indicate that a particular live presentation is going to be available between 2:00 p.m. and 4:00 p.m. on January 1, 2000, or that a particular live presentation is going to last for 45 minutes. Database controller 216 monitors content database 112 for presentations whose time period or "run time" has passed, and deletes the corresponding entries from database 112. According to another implementation, this indication of the duration of the presentation is simply a "presentation over" message or similar indicator. For example, an encoder may register for a current live presentation, and then send a "presentation over" message to the server 106 when the presentation has completed. Upon receipt of the "presentation over" message, database controller 216 deletes the entry corresponding to the presentation from database 112.

In one implementation of the invention, database controller 216 also includes a timeout control that monitors the length of time that entries have been in database 112. If a "presentation over" message is not received for a live presentation within a default period of time, then controller 216 assumes that a "presentation over" message was mistakenly not sent (or was lost in transit) and removes the entry corresponding to the live presentation from database 112.

Additionally, in another implementation of the invention a presentation that is scheduled for a particular duration (e.g., 90 minutes, or from 2:00 p.m. to 4:00 p.m.) may be extended. The duration can be extended by the encoder 104 (or other device) sending a message to server 106 to change the duration in the corresponding entry of database 112. For example, the message may indicate to change "90 minutes" to "110 minutes", or to change "2:00 p.m. to 4:00 p.m." to "2:00 p.m. to 5:00 p.m.". Alternatively, the duration may be extended by the encoder 104 (or other device) sending a message to server 106 indicating that server 106 is to ignore the previously identified duration and that a "presentation over" message or similar indicator will be transmitted to server 106 when the presentation is over.

The descriptive information field 238 of an entry includes data that describes the content of the corresponding presentation. In the illustrated example of Fig. 4, the data includes a set of one or more key words describing the presentation. Alternatively, the data could include a summary or abstract of the presentation, or a textual transcript of the presentation.

The data for descriptive information field 238 can be generated manually or automatically. Manual generation refers to an individual (e.g., the presentation author) creating the data. For example, the author may write a summary or a list of key words for the presentation and provide them to server 106 (either directly or via an encoder 104).

Automatic generation refers to one of the components, such as an encoder 104 or server 106, using any of a variety of mechanisms to generate data describing the presentation as the presentation occurs. For example, conventional key word generation processes may be employed to identify key words from the

presentation. This may be carried out by an encoder 104, server 106, or some other component coupled to network 108. By way of another example, closed captioning information may be used as the data, or conventional speech-to-text conversion techniques may be used to convert audio data into text data.

The information maintained in content database 112 is used by search engine 214 to respond to search requests received from users of a client computer 102 (Fig. 1). A user provides, as part of his or her search request, a set of search criteria and which fields the search criteria should be applied to. The user can provide search requests via any of a wide variety of conventional input mechanisms, such as a graphical user interface (GUI). In the illustrated example, the user is able to search any of the fields in content database 214. Search engine 214 compares the user-provided search criteria to each entry in the database 112 to determine whether the presentation corresponding to the entry satisfies the search request. Any of a variety of conventional searching algorithms and methodologies can be used. For example, any entry with at least one word matching one of the search criteria may satisfy the search request, an entry may be required to include every word in the search criteria in order to satisfy the search request, etc.

Information regarding presentations that satisfy a search request are provided to the client computer 102 of the user that placed the request. Such information may be the entire entry from database 112, or alternatively a selected portion (e.g., the title field 230 and source field 232 for the entry). The source field 232 is provided to the client computer to allow the user to subsequently request the presentation, via the client computer, from the appropriate encoder 104. In the illustrated example, the data in source field 232 comprises a uniform

resource locator (URL) that identifies a particular presentation available from a particular encoder.

Information from each entry that satisfies the search criteria is provided to the user and, if multiple entries satisfy the each criteria, then the user can select one or more presentations based on this information. Alternatively, server 106 may rank the entries based on how well they match the search criteria and return information for only the highest ranking entry (or entries) to the user.

In addition to information describing the overall content of the presentation, current "characteristic" information is also (optionally) included in database 112. Characteristic information describing one or more current characteristics of the presentation is registered with search server 106 by the encoder 104. When one or more of the current characteristics changes, the encoder 104 registers the new current characteristic(s) with server 106. Server 106, in response, changes the entry in content database 112 corresponding to the presentation to identify the new current characteristics (e.g., by replacing one or more of the current characteristics or by adding a new characteristic(s)). By continually updating the current characteristics, a user can search for particular characteristics without regard for which actual presentation includes the characteristics. For example, a user may be interested in discussions of Microsoft Corporation and can search for the characteristics "Microsoft" or "Bill Gates" across multiple presentations registered with server 106.

A current characteristic has a duration analogous to that of the presentation discussed above. Each characteristic may have its own duration, or multiple characters for a presentation may have the same duration. The duration of the characteristics can be identified explicitly (e.g., the author may indicate that

Microsoft Corporation will be discussed from 2:07 p.m. to 2:12 p.m., or that the current characteristic of Microsoft Corporation will be accurate for the next seven minutes, or a "characteristic over" indicator (such as a "cancel characteristic" message) may be transmitted to server 106 from encoder 104). Alternatively, the duration of the characteristics can be identified implicitly (e.g., the previous current characteristics are over when new current characteristics information is received).

Current characteristics data can also be generated either manually or automatically, analogous to the generation of data for descriptive information field 238 discussed above. For example, an algorithm may use closed captioning data or a speech-to-text conversion algorithm to obtain a textual version of the presentation. Key words can then be identified from the textual version and if their frequency is high enough (e.g., the word "Microsoft" occurs at least a threshold number of times, such as ten, within a period of time, such as sixty seconds or every 500 words), then those key words are identified as the current topic data.

Current characteristics information can be deleted from database 112 in an immediate manner. That is, as soon as new current characteristics data is received, the previous current characteristics data is deleted. Alternatively, the current characteristic information may be "aged out" of database 112 gradually. For example, if new current characteristics are identified and the key words that caused the identification of the previous current characteristics are not detected within a threshold amount of time (e.g., ten minutes), then the previous current characteristics are deleted from database 112. This aging out can be implemented

by server 106, or alternatively can be used by encoder 104 in determining when to transmit a "characteristic over" indicator to server 106.

Thus, using characteristics, it can be seen that the results of a search request can vary depending on when during the presentation the search request is made.

Alternatively, the current characteristics for a presentation can be displayed to the user rather than used for searching. For example, a user may submit a search request that results in multiple live presentations with descriptive information 238 satisfying the search criteria. Search server 106 transmits the current characteristics for each of these matching live presentations (as well as other information, such as title 230) to client 102 for display to the user. Search server 106 also transmits any changes in the current characteristics for these matching live presentations to client 102. Thus, client 102 presents to the user a continually updating display of the current characteristics of the live presentations that satisfy his or her search request.

Database controller 216 also maintains notification database 114. A user can register a "notification request" with server 106 that includes a search request and a notification type. The search request includes the user's search criteria and the notification type identifies how the user wants to be notified in the event a live presentation begins that matches the search criteria. In one implementation, a user can register an email address, a pager number, a cellular phone (or other telephone) number, etc.

Database controller 216 receives the notification request and places the search criteria and notification type in notification database 114. Database controller 216 also invokes search engine 214 to determine whether any current entry in content database 112 satisfies the search criteria. If a match is found, then

the user is notified in a manner according to the notification type. The notification request may then be removed from notification database 114, or alternatively left in notification database 114 to detect subsequent matches.

If a match is not immediately found, then database controller 216 continues to invoke search engine 214 each time new information is placed in content database 112. Once invoked, search engine 214 determines whether the new information results in an entry that matches any of the search criteria of notification requests in notification database 114. This search may be compared to all entries in content database 112, or alternatively only to the entries in database 112 that include the new information.

Fig. 5 shows exemplary steps in a process for allowing searching of live presentations. Steps on the left side of dashed line 250 are carried out by an encoder 104 of Fig. 1, and steps on the right side of dashed line 250 are carried out by search server 106 of Fig. 1. These steps may be performed in software. Fig. 5 is described with additional reference to components in Fig. 1.

Initially, encoder 104 sends identifying information for a current live presentation to search server 106 (step 252). This identifying information is received by server 106 (step 254), which records the information and makes the information available for user searches (step 256). The identifying information is used by server 106 in responding to any subsequent search requests it receives (step 258).

While server 106 is performing steps 254 – 258, encoder 104 continues to stream the live presentation to any of the client computers 102 that request it until the presentation is over (steps 260 and 262). When the presentation is over,

encoder 104 stops streaming the presentation to client computers 102 and sends a "presentation over" indication to server 106 (step 264).

Server 106 receives the "presentation over" indication from encoder 104 (step 266) and deletes its record of the identifying information regarding the presentation (step 268). Thus, any subsequent search requests will not be compared to the identifying information for that presentation, as that presentation is over.

Alternatively, rather than relying on a "presentation over" indication in step 266, server 106 may be informed of the end of the presentation in other manners (such as a pre-programmed duration).

Fig. 6 shows exemplary steps in a process for allowing searching of current characteristic information in live presentations. Steps on the left side of dashed line 280 are carried out by an encoder 104 of Fig. 1, and steps on the right side of dashed line 280 are carried out by search server 106 of Fig. 1. These steps may be performed in software. Fig. 6 is described with additional reference to components in Fig. 1.

Initially encoder 104 sends, to search server 106, current characteristic(s) information for the portion of a live presentation currently being presented (step 282). Search server 106 in turn receives the current characteristic(s) information (step 284). Server 106 records the current characteristic(s) information and makes the information available for searching (step 286). The characteristic(s) information is used by server 106 in responding to any subsequent search requests it receives (step 288).

While server 106 is performing steps 284 – 288, encoder 104 continues to stream the live presentation to any of the client computers 102 that request it (step

290). Encoder 104 also checks whether the current characteristic(s) are over (step 292). When the current characteristic(s) are over (e.g., they no longer describe the portion of the live presentation currently being presented), encoder 104 sends a "characteristic(s) over" indication to server 106 (step 294).

Server 106 receives the characteristic(s) over indication from encoder 104 (step 296) and deletes its record of the characteristic(s) information (step 298). Thus, any subsequent search requests will not be compared to the characteristic(s) information for that presentation, as those characteristic(s) are over.

Conclusion

The invention allows for the searching of live presentations. An encoder providing a live presentation registers with a search server, advantageously making information identifying the presentation available for searching only for the duration of the presentation. Additionally, characteristic information identifying current characteristic(s) of the presentation can be registered with the search server only for the duration of that characteristic(s). Thus, the characteristic information is advantageously made available for only as long as that characteristic(s) describes the current portion of the live presentation.

Although the invention has been described in language specific to structural features and/or methodological steps, it is to be understood that the invention defined in the appended claims is not necessarily limited to the specific features or steps described. Rather, the specific features and steps are disclosed as preferred forms of implementing the claimed invention.

CLAIMS

1. A system comprising:

a search server;

an encoder;

a client computer;

wherein the encoder is to provide an indication of a currently available live presentation to the search server;

wherein the client computer is to submit a request with search criteria to the search server;

wherein the search server is to,

determine whether the currently available live presentation from the encoder matches the search criteria, and

transmit an identifier of the encoder to the client computer if the currently available live presentation matches the search criteria; and

wherein the encoder is to provide the live presentation to the client computer.

2. A system as recited in claim 1, wherein the encoder is further to provide a subsequent indication to the search server indicating that the live presentation is over.

3. A system as recited in claim 1, wherein the encoder further provides to the search server, during the live presentation, information identifying current characteristics of the live presentation.

4. A system as recited in claim 3, wherein:

the search server is further to transmit the information identifying current characteristics of the live presentation to the client computer; and

the client computer is further to display the information identifying current characteristics of the live presentation.

5. A system as recited in claim 3, wherein:

the information identifying current characteristics comprises a topic description; and

the encoder provides a characteristics over indication to the search server when the topic identified by the topic description is no longer being presented.

6. A system as recited in claim 3, wherein the information identifying the current characteristics comprises text corresponding to the live presentation.

7. A system as recited in claim 1, wherein the live presentation comprises an audio/video streaming media presentation.

8. A system as recited in claim 1, wherein the search server is further to:

maintain a record of user search requests; and

notify the corresponding user when a new live presentation becomes available that satisfies a search request.

9. A method comprising:

sending, to a search server, information identifying a live presentation available over a network at the beginning of the live presentation; and

identifying, to the search server, when the live presentation is no longer available over the network.

10. A method as recited in claim 9, wherein the identifying comprises sending, to the search server, an indication of the duration of the live presentation.

11. A method as recited in claim 9, wherein the identifying comprises sending, to the search server, an indication of when the live presentation has ended.

12. A method as recited in claim 9, further comprising sending, to the search server, an identifier of an encoder from which the live presentation can be obtained.

13. A method as recited in claim 12, wherein the sending the identifier comprises sending, as the identifier, a uniform resource locator (URL).

14. A method as recited in claim 9, further comprising identifying, to the search server, information indicating characteristics of a part of the live presentation currently being presented.

15. A method as recited in claim 14, wherein the identifying information includes sending, to the search server, an indication of the duration of the characteristics.

16. A method as recited in claim 15, wherein the identifying information comprises:

sending, to the search server, an indication of the characteristics when the current characteristics begin to describe the live presentation; and

sending, to the search server, a characteristics over indication when the current characteristics no longer describe the live presentation.

17. A method as recited in claim 9, further comprising generating the information identifying the live presentation as the live presentation is presented over the network.

18. A method as recited in claim 17, wherein the generating comprises identifying key words as the live presentation is presented.

19. A method as recited in claim 9, further comprising using closed captioning data as the information identifying the live presentation.

20. A method as recited in claim 9, wherein the live presentation comprises a composite media stream having an audio stream and a video stream.

21. One or more computer-readable memories containing a computer program that is executable by a processor to perform the method recited in claim 9.

22. A method comprising:

receiving information identifying a live presentation; and

making the information available for searching only for the duration of the live presentation.

23. A method as recited in claim 22, wherein the receiving comprises receiving information identifying a live presentation scheduled to occur in the future.

24. A method as recited in claim 22, wherein the receiving comprises receiving information identifying a currently available live presentation.

25. A method as recited in claim 22, further comprising:

receiving information identifying a plurality of live presentations; and

for each live presentation, making the information identifying the live presentation available for searching only for the duration of the live presentation.

26. A method as recited in claim 25, further comprising:

maintaining a record of user search requests; and

notifying the corresponding user when a new live presentation that satisfies a search request is available.

27. A method as recited in claim 26, further comprising:

receiving, for each of the user search requests, an indication of how the user should be notified; and

notifying the user in accordance with the notification.

28. A method as recited in claim 22, wherein the receiving comprises receiving the information from a same encoder as is presenting the information.

29. A method as recited in claim 22, wherein the making the information available for searching comprises:

adding the information to a database of currently available live presentations; and

deleting the information from the database when the live presentation has ended.

30. A method as recited in claim 29, further comprising:

receiving a user search request; and

accessing the database of currently available live presentations to determine whether a currently available live presentation matches the user search request.

31. A method as recited in claim 22, further comprising receiving an indication, from an encoder that is presenting the information, that the live presentation is over.

32. A method as recited in claim 22, further comprising:

receiving information identifying a current characteristic of the live presentation; and

making the current characteristic available for searching for as long as the characteristic describes a currently presenting portion of the live presentation.

33. A method as recited in claim 32, wherein the making the current characteristic available for searching comprises:

adding the information identifying the current characteristic to a database of currently available live presentations; and

deleting the information identifying the current characteristic from the database when the characteristic no longer describes the currently presenting portion of the live presentation.

34. A method as recited in claim 32, further comprising:

maintaining a record of user search requests; and

alerting a corresponding user when a new current characteristic that satisfies a search request describes the currently presenting portion of the live presentation.

35. A method as recited in claim 33, further comprising:

receiving a user search request; and

checking the database of currently available live presentations to determine, based at least in part on the current characteristic in the database, whether a currently available live presentation matches the user search request.

36. A method as recited in claim 22, further comprising:

receiving information identifying a current characteristic of the live presentation; and

transmitting the information identifying the current characteristic of the live presentation to a client computer.

37. A method as recited in claim 22, further comprising:

generating, based at least in part on the information identifying the live presentation, descriptive information corresponding to the live presentation; and

adding the descriptive information to a database of currently available live presentations.

38. A method as recited in claim 22, wherein the live presentation includes an audio stream and a video stream.

39. One or more computer-readable memories containing a computer program that is executable by a processor to perform the method recited in claim 22.

40. One or more computer-readable media having stored thereon a computer program that, when executed by one or more processors, causes the one or more processors to perform functions including:

identifying topic information corresponding to live content, the topic information identifying a current topic of the live content; and

transmitting the topic information to a server to make the topic information available for searching.

41. One or more computer-readable media as recited in claim 40, wherein the transmitting comprises transmitting the topic information to a search server.

42. One or more computer-readable media as recited in claim 40, wherein the transmitting comprises transmitting the topic information to an encoder.

43. One or more computer-readable media as recited in claim 40, further comprising transmitting a topic over indication to the server when the topic information is no longer the current topic.

44. One or more computer-readable media as recited in claim 43, wherein the transmitting the topic over indication comprises transmitting, as the topic over indication, a cancel topic indicator.

45. One or more computer-readable media as recited in claim 43, wherein the transmitting the topic over indication comprises transmitting, as the topic over indication, new current topic information.

46. An apparatus comprising:

a bus;

a processor coupled to the bus; and

a memory, coupled to the bus, to store a plurality of instructions that are executed by the processor, wherein the plurality of instructions, when executed, cause the processor to,

receive information identifying live content,

maintain the information for as long as the live content is available, and

use the information to respond to searches from a plurality of client computers.

47. An apparatus as recited in claim 46, wherein the instructions to receive information identifying live content are to receive information identifying live content available from an encoder at the time the information is received.

48. An apparatus as recited in claim 46, further comprising a nonvolatile storage device, coupled to the bus, to record the information identifying live content.

49. An apparatus as recited in claim 46, wherein the plurality of instructions, when executed, further cause the processor to store the information identifying live content in the memory.

50. An apparatus as recited in claim 46, wherein the information identifying live content includes a set of descriptive words and an indicator of a server from which the live content is available.

51. An apparatus as recited in claim 50, wherein the indicator of the server comprises a uniform resource locator (URL).

52. An apparatus as recited in claim 46, wherein the plurality of instructions, when executed, further cause the processor to:

receive information identifying current characteristics of the live content;

maintain the information identifying the current characteristics for as long as the characteristics describe the live content; and

use the information identifying the current characteristics to respond to searches from the plurality of client computers.

53. An apparatus as recited in claim 46, wherein the plurality of instructions, when executed, further cause the processor to:

receive information identifying current topic information identifying a topic currently being presented as part of the live content;

receive an indication that the topic is no longer being presented;

maintaining the topic information for a period of time after receiving the indication that the topic is no longer being presented; and

using the current topic information to respond to searches from the plurality of computers during the period of time.

54. An apparatus as recited in claim 46, wherein the plurality of instructions, when executed, further cause the processor to generate, based on the information identifying live content, descriptive information to be added to a database of live content.

55. A method comprising:

identifying a set of search criteria to be compared to information describing a plurality of live presentations;

transmitting the set of search criteria to a server; and

receiving a list of live presentations currently in progress that match the search criteria.

56. A method as recited in claim 55, further comprising:

selecting a live presentation from the list of live presentations; and

requesting that the selected live presentation be transmitted to a client computer corresponding to a user making the selection.

57. A method as recited in claim 55, further comprising:

transmitting a notification type to the server that indicates how a user that identifies the set of search criteria should be notified by the server when a live presentation is determined by the server to match the search criteria.

ABSTRACT

In a networked client/server system, live presentations can be streamed from an encoder or other server to a client computer. Additionally, information describing the presentation is registered with a search server. This information is made available for user searches only for as long as the information properly describes the live presentation. When the information no longer describes a current live presentation, the information is no longer available for searching.

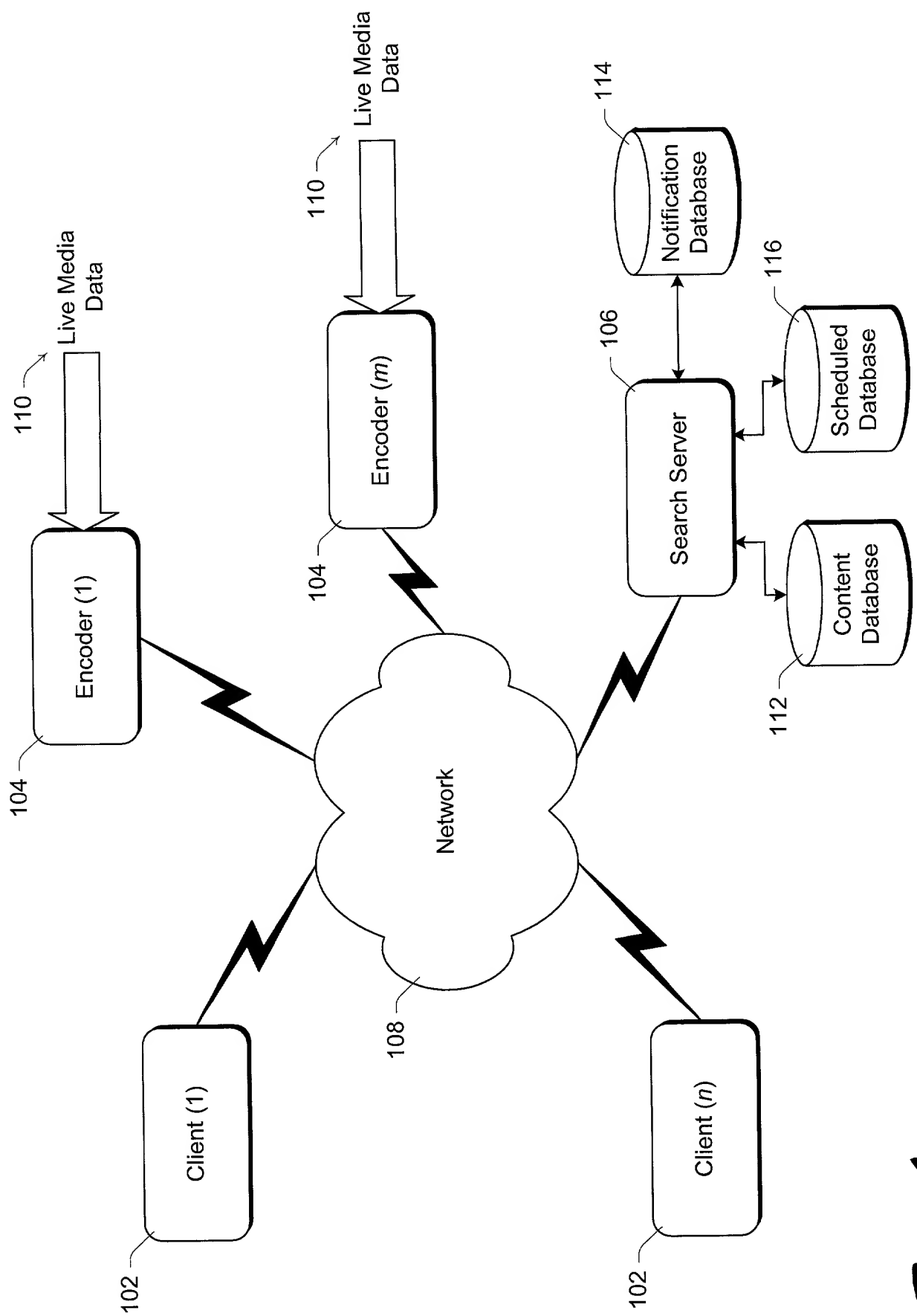
Live Media Data
110
Encoder (1)
104
Live Media Data
110
Encoder (m)
104
Network
108
Client (1)
102
Client (n)
102
Search Server
106
Notification Database
114
Scheduled Database
116
Content Database
112

Fig. 1

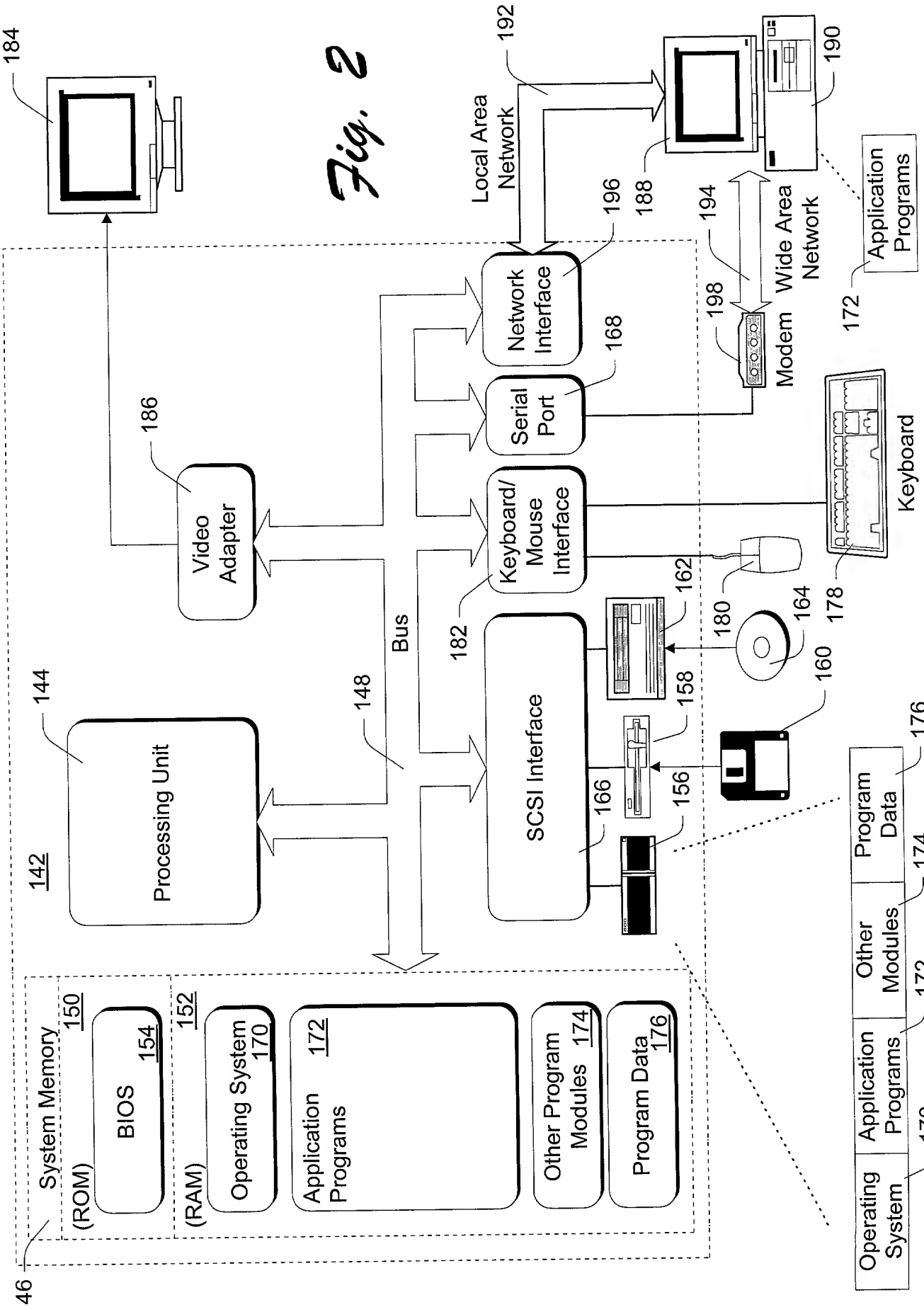
Fig. 2
146
System Memory
(ROM)
150
BIOS
154
(RAM)
152
Operating System
170
Application Programs
172
Other Program Modules
174
Program Data
176
142
Processing Unit
144
148
Bus
Video Adapter
186
Keyboard/ Mouse Interface
182
Serial Port
168
Network Interface
196
SCSI Interface
166
156
158
162
164
160
180
178
Keyboard
Modem
198
194
Wide Area Network
Local Area Network
192
188
190
184
Application Programs
172
Operating System
170
Application Programs
172
Other Modules
174
Program Data
176

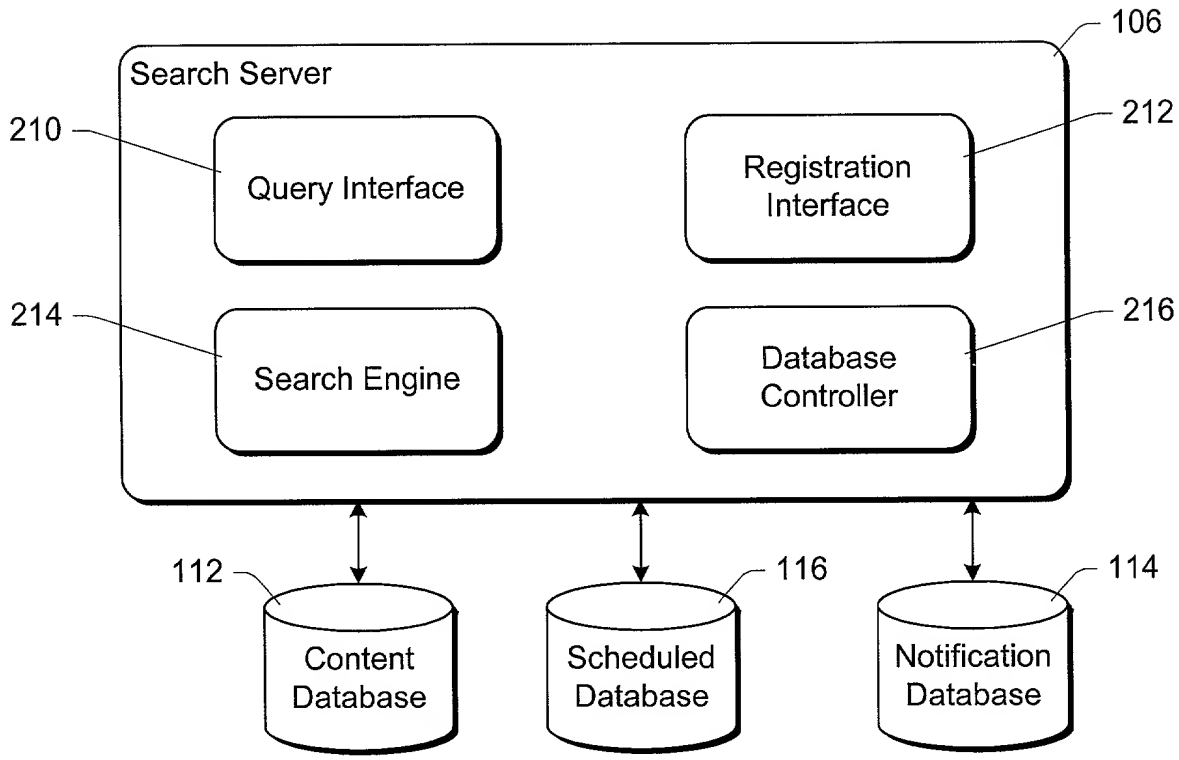
106
Search Server
210
Query Interface
212
Registration Interface
214
Search Engine
216
Database Controller
112
Content Database
116
Scheduled Database
114
Notification Database

Fig. 3

Characteristics 236

Content Database 112

Title 230	Source 232	Duration 234	Characteristics 236	Descriptive Information 238
Internet Training	W	2:00 p.m. - 4:00 p.m.	Accessing Internet	Internet, Training, Network, Web, Authoring
College Football Summary	X	30 minutes	University of Michigan	College, Football, NCAA
Microsoft Press Conference	W, Y		Presenter - Bill Gates	Microsoft, Press Release, Bill Gates
News	Z		Sports	News, National

Fig. 4

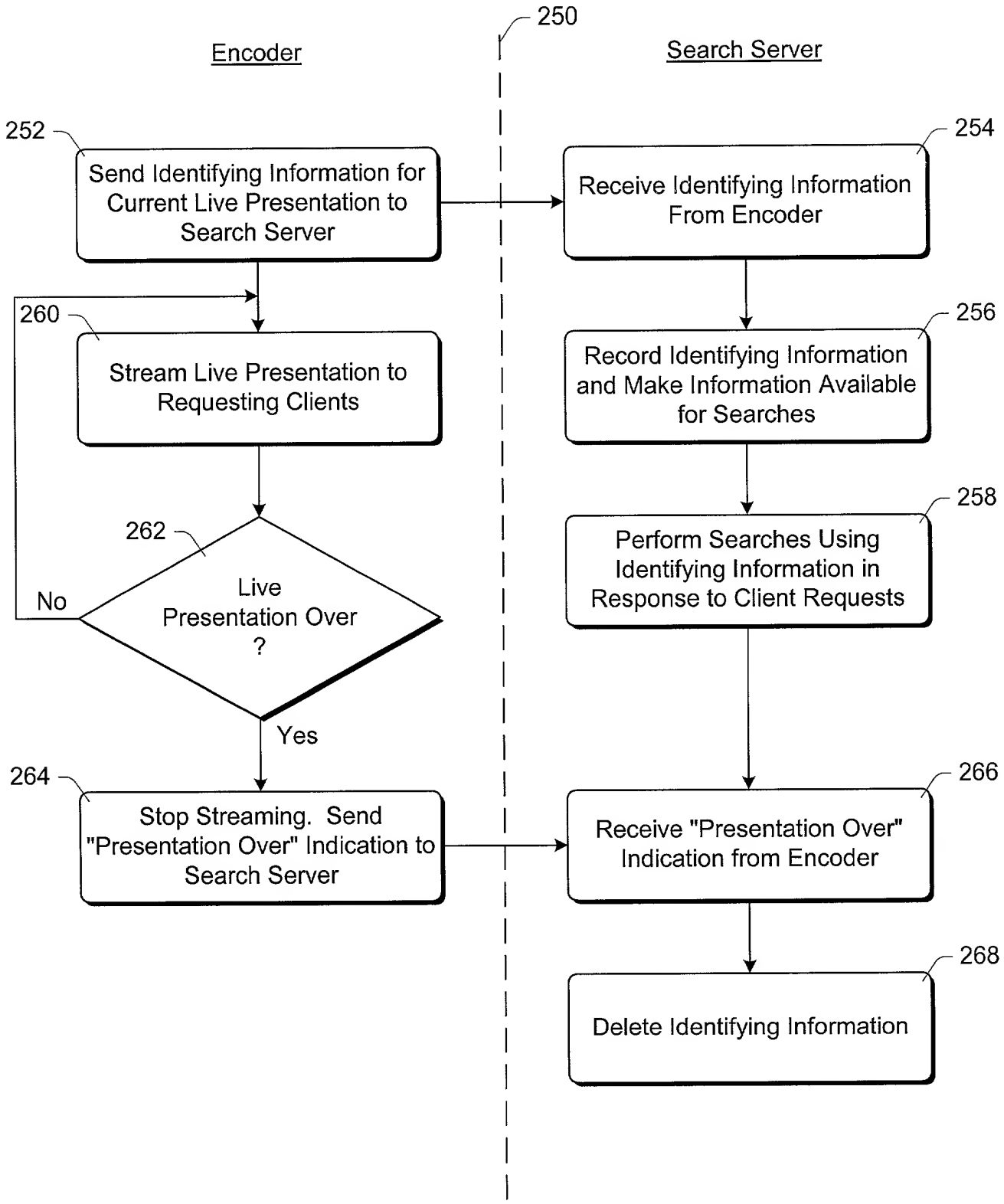
250
Encoder
Search Server
252
Send Identifying Information for Current Live Presentation to Search Server
254
Receive Identifying Information From Encoder
260
Stream Live Presentation to Requesting Clients
256
Record Identifying Information and Make Information Available for Searches
262
Live Presentation Over ?
No
Yes
258
Perform Searches Using Identifying Information in Response to Client Requests
264
Stop Streaming. Send "Presentation Over" Indication to Search Server
266
Receive "Presentation Over" Indication from Encoder
268
Delete Identifying Information

Fig. 5

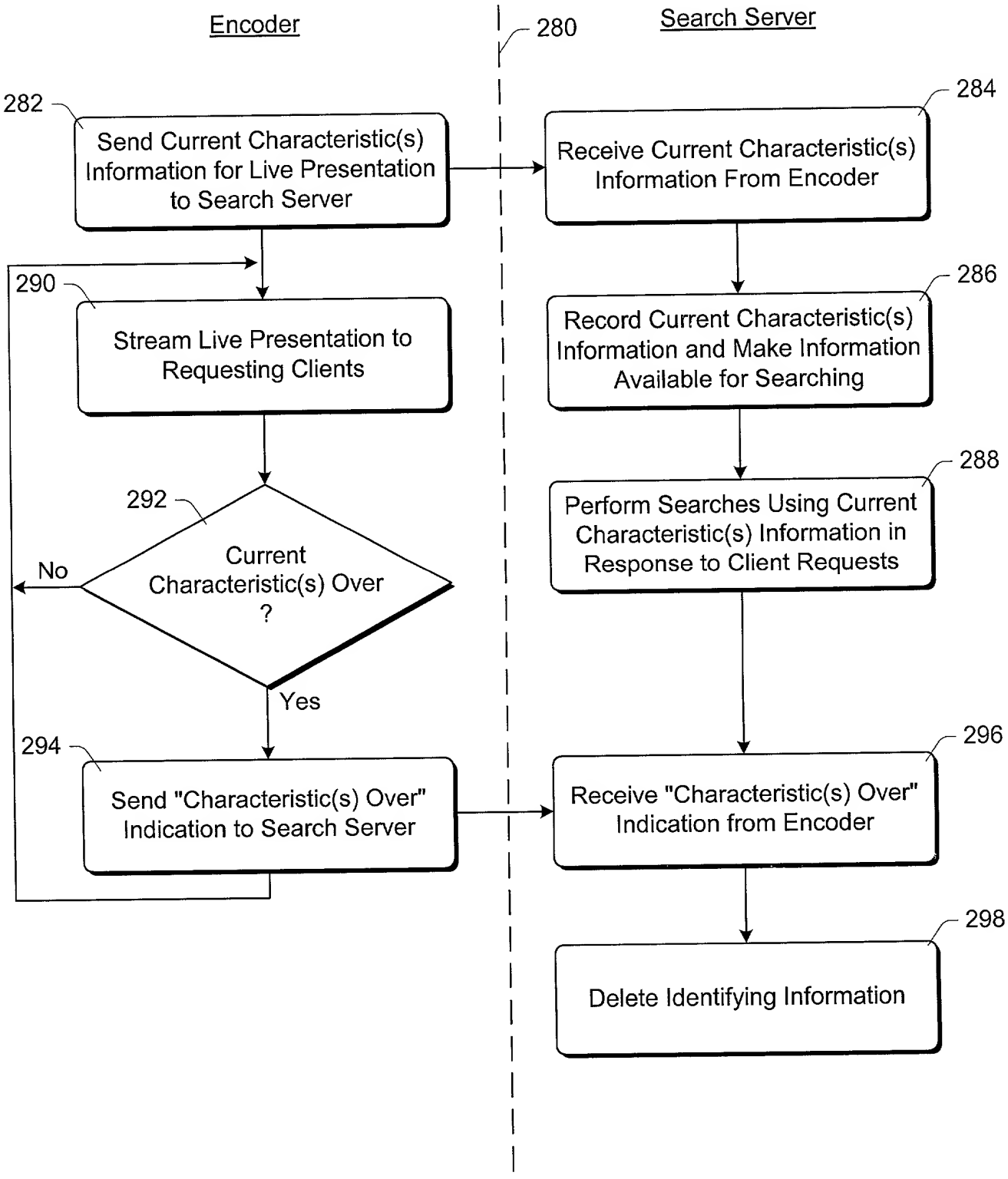
Encoder
280
Search Server
282
Send Current Characteristic(s) Information for Live Presentation to Search Server
284
Receive Current Characteristic(s) Information From Encoder
290
Stream Live Presentation to Requesting Clients
286
Record Current Characteristic(s) Information and Make Information Available for Searching
292
Current Characteristic(s) Over ?
No
Yes
288
Perform Searches Using Current Characteristic(s) Information in Response to Client Requests
294
Send "Characteristic(s) Over" Indication to Search Server
296
Receive "Characteristic(s) Over" Indication from Encoder
298
Delete Identifying Information

Fig. 6

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventorship.....Omoigui
Applicant ..... Microsoft Corporation
Attorney's Docket No. MS1-364US
Title: Live Presentation Searching

DECLARATION FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled "Live Presentation Searching," the specification of which is attached hereto.

I have reviewed and understand the content of the above-identified specification, including the claims.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, § 1.56(a).

PRIOR FOREIGN APPLICATIONS: no applications for foreign patents or inventor's certificates have been filed prior to the date of execution of this declaration.

Power of Attorney

I appoint the following attorneys to prosecute this application and transact all future business in the Patent and Trademark Office connected with this application: Lewis C. Lee, Reg. No. 34,656; Daniel L. Hayes, Reg. No. 34,618; Allan T. Sponseller, Reg. 38,318; Steven R. Sponseller, Reg. No. 39,384; James R.

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All statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statement may jeopardize the validity of the application or any patent issued therefrom.

* * * * * * * * * *

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